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TABLE 1-a
Chemical Concentrations at Evergreen Manor Site (2000 and 2002)

Residential Wells and Groundwater Samples

Chemical	Residential Wells			Groundwater		
	Detected Concentrations (ug/l)	Frequency of Detection	Maximum Concentration Location	Detected Concentrations (ug/l)	Frequency of Detection (1)	Maximum Concentration Location
1,1,1-Trichloroethane	0.9 - 5	6/22	RW-07	0.29 - 3	12/22	MW-103, MW-05, CPT-11
1,1-Dichloroethane	ND			0.19 - 2	4/22	CPT-11
1,1-Dichloroethene	ND			0.16 - 0.2	1/22	MW-03
2-Butanone	ND			16	1/22	CPT-05
Acetone	0.6 - 0.8	2/22	RW-03	1 B - 470	11/22	CPT-02
Benzene	ND			0.5 - 0.6	2/22	CPT-09
Chloroform	0.9	1/22	RW-08	0.23	1/22	MW-02 (replaced RW-08)
Cis-1,2-Dichloroethene	2	1/22	RW-04	0.39 - 2	3/22	MW-105
Ethyl benzene	ND			0.6	1/22	CPT-09
Freon 113	ND			2 - 300	2/22	MW-103
m, p-xylene	ND			0.5 - 0.7	3/22	CPT-06, CPT-09
Methylene chloride	ND			0.5	1/22	CPT-03
PCE	0.9 - 2	2/22	RW-04	0.18 - 9	9/22	MW-103
Toluene	1B - 2 B	9/22	RW-13, RW-14, RW-15, RW-17, RW-18, RW-22	0.5 - 3	10/22	CPT-11
TCE	0.7 - 6	3/22	RW-04	0.24 - 7.2	5/22	MW-03
o-Xylene	ND			0.6	2/22	CPT-02, CPT-11

ND - Not detected

- Not available

B - Chemical detected in blank sample but at a concentration less than 10 times the reported sample concentration.

(1) Shallow and deep wells and multiple depths at CPT locations considered 1 location.

TABLE 1-b
Chemical Concentrations at Evergreen Manor Site (2000 - 2002)

Soil Gas and Indoor Air

Chemical	Soil Gas			Indoor Air		
	Detected Concentrations (ug/m3)	Frequency of Detection (1)	Maximum Concentration Location	Detected Concentrations (ug/m3)	Frequency of Detection (1)	Maximum Concentration Location
1,1,1-Trichloroethane	0.2 - 4	4/4	Home B	0.21 - 5.3	4/4	Home A
1,1-Dichloroethane	NA			NA		
1,1-Dichloroethene	NA			NA		
2-Butanone	1.6 - 16	4/4	Home C	2.4 - 27	4/4	Home D
Acetone	19 - 62	4/4	Home B	25 - 120	4/4	Home D
Benzene	1.2 - 31	4/4	Home A	0.72 - 22	4/4	Home D
Chloroform	0.86 - 6	3/4	Home B	0.42 - 3	4/4	Home D
Cis-1,2-Dichloroethene	ND			ND		
Ethyl benzene	0.98 - 41	4/4	Home A	0.48 - 13	4/4	Home B
Freon 113	0.4 - 0.78	4/4	Home B, Home D	0.42 - 0.46	4/4	Home C
m,p-xylene	1.8 - 60	4/4	Home C	1.3 - 57	4/4	Home B
Methylene chloride	0.55 - 0.98	4/4	Home C	0.88 - 99	4/4	Home B
PCE	0.28 - 190	4/4	Home C	0.7 - 11	4/4	Home B
Toluene	2.5 - 150	4/4	Home C	4.2 - 68	4/4	Home D
TCE	0.52 - 9.5	3/4	Home C	ND		
o-Xylene	0.73 - 25	4/4	Home A	0.55 - 13	4/4	Home B

NA - Not analyzed

ND - Not detected

(1) Each home considered 1 location.

TABLE 1-c
Chemical Concentrations at Evergreen Manor Site (2000 - 2002)

Surface Water and Sediment In Rock River Within and Downstream of Groundwater Discharge Zone

Chemical	Surface Water			Sediment		
	Detected Concentrations (ug/l)	Frequency of Detection	Maximum Concentration Location	Detected Concentrations (ug/kg)	Frequency of Detection	Maximum Concentration Location
1,1,1-Trichloroethane	ND			ND		
1,1-Dichloroethane	ND			ND		
1,1-Dichloroethene	ND			ND		
2-Butanone	ND			3	1/10	SD-04
Acetone	ND			ND		
Benzene	ND			ND		
Chloroform	ND			ND		
Cis-1,2-Dichloroethene	ND			ND		
Ethyl benzene	ND			ND		
Freon 113	ND			2 - 8	2/10	SD-01
m,p-xylene	ND			ND		
Methylene chloride	ND			ND		
PCE	ND			ND		
Toluene	ND			4 - 17	2/10	SD-01
TCE	ND			ND		
o-Xylene	ND			ND		

ND - Not detected

TABLE 2
Chemicals of Concern in Groundwater
2000 Risk Assessment

Chemical	Detected Concentrations		Units	Screening Toxicity Value	Chemical of Concern?
	Minimum	Maximum			
1,1,1-Trichloroethane	0.6	5	ug/l	79	NO
1,1-Dichloroethane		2	ug/l	70	NO
1,1-Dichloroethene	-	-	ug/l		NO
2-Butanone		16	ug/l	190	NO
Acetone	0.6	100	ug/l	61	YES
Benzene	0.5	0.6	ug/l	0.04	YES
Cis-1,2-Dichloroethene	1	2	ug/l	6.1	NO
Ethyl benzene		0.6	ug/l	130	NO
Freon 113	2	300	ug/l	NA	NO
m,p-xylene	0.5	0.7	ug/l	140	NO
Methylene chloride		0.5	ug/l	0.43	YES
PCE	0.6	9	ug/l	0.11	YES
Toluene	1	3	ug/l	72	NO
TCE	0.7	6	ug/l	0.16	YES
o-Xylene		0.6	ug/l	140	NO

- Not detected
NA Not available
(1) The screening toxicity value is the risk-based IEPA Tiered Approach to Cleanup Objectives Value for each chemical adjusted to a cancer risk of 1×10^{-7} and a noncancer hazard index of 0.1.

TABLE 3
Exposure Point Concentrations in Groundwater
2000 Risk Assessment

Chemical	Detected Concentrations		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure	Rationale
	Minimum	Maximum						
Acetone	0.6	100	ug/l	34/108	100	ug/l	Maximum	Undefined center of plume
Benzene	0.5	0.6	ug/l	3/108	0.6	ug/l	Maximum	Undefined center of plume
Methylene chloride		0.5	ug/l	1/108	0.5	ug/l	Maximum	Undefined center of plume
PCE	0.6	9	ug/l	5/108	9	ug/l	Maximum	Undefined center of plume
TCE	0.7	6	ug/l	14/108	6	ug/l	Maximum	Undefined center of plume

This table presents the chemicals of concern (COCs) and exposure point concentration for each of the COCs detected in groundwater in the 2000 Risk Assessment (i.e., the concentrations that will be used to estimate the exposure and risk from the COCs in the groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the exposure point concentration, and how the exposure point concentration was derived. The table indicates that acetone was the most frequently detected chemical at the site. The 2000 Risk Assessment used the maximum concentrations detected as the exposure point concentrations because the center of the contaminated groundwater plume is undefined and actual groundwater concentrations could be higher than those shown.

**TABLE 4-a
Toxicity Data
Groundwater Exposure
2000 Risk Assessment**

Cancer Toxicity Data

Pathway: Ingestion, Dermal

Chemical	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Acetone	NC	NC	(mg/kg)/day	D	IRIS	7/7/00
Benzene	5.5E-02	5.5E-02	(mg/kg)/day	A/leukemia	IRIS	7/7/00
Methylene chloride	7.5E-03	7.5E-03	(mg/kg)/day	B2/hepatocellular	IRIS	7/7/00
PCE	5.2E-02	5.2E-02	(mg/kg)/day	NA/liver	NCEA/Region 9	11/29/99
TCE	1.1E-02	1.1E-02	(mg/kg)/day	NA	NCEA/Region 9	11/29/99

Pathway: Inhalation

Chemical	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Acetone	NC	-	-	-	-	D	IRIS	7/7/00
Benzene	7.8E-06	(ug/m3) ⁻¹	3500	2.73E-02	(mg/kg)/day	A/leukemia	IRIS	7/7/00
Methylene chloride	4.7E-07	(ug/m3) ⁻¹	3500	1.6E-03	(mg/kg)/day	B2/adenomas & carcinomas	IRIS	7/7/00
PCE	5.7E-07	(ug/m3) ⁻¹	3500	2E-03	(mg/kg)/day	NA/liver	NCEA/ Region 9	11/29/99
TCE	1.1E-02	(ug/m3) ⁻¹	3500	6E-03	(mg/kg)/day	NA	NCEA/ Region 9	11/29/99

NC - Not a carcinogen

IRIS: Integrated Risk Information System, U.S. EPA

NCEA: National Center for Environmental Assessment, U.S. EPA

A - Human carcinogen

B1 - Probable human carcinogen; limited human data are available

B2 - Probable human carcinogen; sufficient evidence in animals; inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

This table provides carcinogenic risk information for the contaminants of concern in groundwater. These values were used in the 2000 Risk Assessment. Acetone is not a carcinogen so cancer risks were not calculated for acetone. Also, at this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in the risk assessment were extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. However, adjustment was not necessary for the chemicals evaluated at the Evergreen Manor site and the dermal carcinogenic slope factor was assumed to be the same as the oral slope factor.

Inhalation slope factors for the chemicals of concern were calculated by multiplying the unit risk value, which is expressed in terms of (ug/m3)⁻¹ by (70 kg)/(20 m3/day)/(10⁻³) to yield an inhalation slope factor in (mg/kg)/day.

Also, since the 2000 Risk Assessment, U.S. EPA reevaluated the cancer toxicity values for 2 of the chemicals - trichloroethene (TCE) and tetrachloroethene (PCE) - and currently recommends that the potential risks from these chemicals be evaluated using the most recent toxicity values. In 2003 U.S. EPA recalculated the potential risks for adult residential exposure to TCE and PCE in groundwater at the Evergreen Manor site using the currently recommend toxicity values and the concentrations of TCE and PCE detected in the groundwater in 2002. The updated toxicity information for these chemicals and the recalculated risks are shown in Table 6.

**TABLE 4-b
Toxicity Data
Groundwater Exposure
2000 Risk Assessment**

Noncancer Toxicity Data

Pathway: Ingestion, Dermal

Chemical	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD/ Target Organ	Date
Acetone	Subchronic	1E-01	mg/kg- day	1E-01	mg/kg- day	liver/ kidney	1000	IRIS	7/7/00
Benzene	NA	3E-03	mg/kg- day	3E-03	mg/kg- day	NA	NA	NCEA/ Region 9	11/29/99
Methylene chloride	Chronic	6E-02	mg/kg- day	6E-02	mg/kg- day	liver	100	IRIS	7/7/00
Tetrachloroethene	Subchronic	1E-02	mg/kg- day	1E-02	mg/kg- day	liver	1000	IRIS	7/7/00
Trichloroethene	NA	6E-03	mg/kg- day	6E-03	mg/kg- day	NA	NA	Withdrawn/ Region 9	11/29/99

Pathway: Inhalation

Chemical	Chronic/ Subchronic	Inhalation RfC	Units	Adjusted Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfC/RfD/ Target Organ	Date
Acetone	Subchronic	NA	NA	1E-01	mg/kg- day	liver/kidney	1000	Route extrapolation	7/7/00
Benzene	NA	6E-3	ug/m3	1.7E-03	mg/kg- day	NA	NA	NCEA/ Region 9	7/7/00
Methylene chloride	NA	NA	NA	8.6E-01	mg/kg- day	NA	NA	HEAST/ Region 9	7/7/00
Tetrachloroethene	Subchronic	3.9E-01	ug/m3	1.1E-01	mg/kg- day	liver	1000	NCEA/ Region 9	11/29/99
Trichloroethene	NA	2.1E-02	ug/m3	6E-03	mg/kg- day	NA	NA	Route Extrapolation/ Region 9	11/29/99

NA - Not available

IRIS: Integrated Risk Information System, U.S. EPA

NCEA: National Center for Environmental Assessment, U.S. EPA

HEAST: Health Effects Assessment Summary Tables

This table provides noncarcinogenic risk information for the contaminants of concern in groundwater. These values were used in the 2000 Risk Assessment. Dermal RfDs can be extrapolated from oral RfDs by applying an adjustment factor as appropriate. However, no adjustment was necessary for the chemicals at the Evergreen Manor site.

TABLE 5-a
Risk Characterization Summary
Exposure to Groundwater
2000 Risk Assessment

Carcinogens - Reasonable Maximum Exposure

Exposure Point	Chemical	Adult Cancer Risk				Child Cancer Risk			
		Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total
Tap water	Acetone	-	-	-	-	-	-	-	-
	Benzene	3.1 x 10 ⁻⁷	4.3 x 10 ⁻⁸	5.8 x 10 ⁻⁷	9.3 x 10 ⁻⁷	1.8 x 10 ⁻⁷	1.9 x 10 ⁻⁸	3.9 x 10 ⁻⁷	5.9 x 10 ⁻⁷
	Methylene chloride	3.5 x 10 ⁻⁸	1.1 x 10 ⁻⁹	2.8 x 10 ⁻⁸	6.4 x 10 ⁻⁸	2.1 x 10 ⁻⁸	4.6 x 10 ⁻¹⁰	1.9 x 10 ⁻⁸	4.0 x 10 ⁻⁸
	PCE	4.4 x 10 ⁻⁶	1.4 x 10 ⁻⁶	6.3 x 10 ⁻⁷	6.4 x 10 ⁻⁶	2.6 x 10 ⁻⁶	6.1 x 10 ⁻⁷	4.3 x 10 ⁻⁷	3.6 x 10 ⁻⁶
	TCE	6.2 x 10 ⁻⁷	6.6 x 10 ⁻⁸	1.3 x 10 ⁻⁶	2.0 x 10 ⁻⁶	3.6 x 10 ⁻⁷	2.9 x 10 ⁻⁸	8.6 x 10 ⁻⁷	1.2 x 10 ⁻⁶
	Total	5.4 x 10 ⁻⁶	1.5 x 10 ⁻⁶	2.5 x 10 ⁻⁶	9.4 x 10⁻⁶	3.2 x 10 ⁻⁶	6.6 x 10 ⁻⁷	1.7 x 10 ⁻⁶	5.5 x 10⁻⁶

This table provides cancer risk estimates for exposure to groundwater calculated in the 2000 Risk Assessment. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of an adult's and child's exposure to groundwater, as well as the toxicity of the chemicals. For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation: Risk = CDI X SF

where: Risk = a unitless probability (e.g., 2 x 10⁻⁵ of an individual's developing cancer)
 CDI = chronic daily intake averaged over 70 years (mg/kg-day)
 SF = slope factor, expressed as (mg/kg-day)⁻¹.

These risks are probabilities that are usually expressed in scientific notation (e.g., 1 x 10⁻⁶). An excess lifetime cancer risk of 1 x 10⁻⁶ indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1 million chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the cancer risks people face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer in general is estimated to be as high as 1 in 3. U.S. EPA's generally acceptable risk range for site-related exposures is 1 x 10⁻⁴ to 1 x 10⁻⁶.

The total excess lifetime risk estimated for exposure to groundwater at the Evergreen Manor site in the 2000 Risk Assessment is 9.4 x 10⁻⁶ for adults and 5.5 x 10⁻⁶ for children. The main chemicals posing these risks are TCE and PCE. These risks are within U.S. EPA's generally acceptable risk range of 1 x 10⁻⁴ to 1 x 10⁻⁶. However, in 2003 U.S. EPA recalculated the cancer risks for adult residential exposure to TCE and PCE using U.S. EPA's currently recommended toxicity values for these chemicals and the concentrations of TCE and PCE detected in the groundwater in 2002. The recalculated risks for adult exposure to TCE and PCE are shown in Table 6-b. U.S. EPA did not recalculate the risks for child exposure to groundwater since these risks would be less than those calculated under an adult exposure scenario.

TABLE 5-b
Risk Characterization Summary
Exposure to Groundwater
2000 Risk Assessment

Noncarcinogens - Reasonable Maximum Exposure

Exposure Point	Chemical	Adult Noncancer Hazard Quotient				Child Noncancer Hazard Quotient			
		Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total
Tap water	Acetone	2.7E-2	1E-4	1E-1	1.3E-1	6.4E-2	1.8E-4	2.8E-1	3.4E-1
	Benzene	5.5E-3	7.7E-4	3.6E-2	4.2E-2	1.3E-2	1.3E-3	9.8E-2	1.1E-1
	Methylene chloride	2.3E-4	6.9E-6	6E-5	3E-4	5.3E-4	1.2E-5	1.6E-4	7.0E-4
	PCE	2.5E-2	7.9E-3	8.4E-3	4.1E-2	5.8E-2	1.4E-2	2.3E-2	9.5E-2
	TCE	2.7E-2	2.9E-3	1E-1	1.3E-1	6.4E-2	5.1E-3	2.8E-1	3.5E-1
	Total Hazard Index	8.5E-2	1.2E-2	2.4E-1	0.34	2.0E-1	2.1E-2	6.8E-1	0.9

This table provides noncancer hazard quotients for each route of exposure and the hazard index (the sum of all hazard quotients) for all routes of exposure to groundwater calculated in the 2000 Risk Assessment. The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any harmful effects. The ratio of exposure to toxicity is called a hazard quotient. A hazard quotient <1 indicates that a person's dose of a single contaminant is less than the RfD and that toxic noncarcinogenic effects from that chemical are unlikely. The hazard index is calculated by adding the hazard quotients for all chemicals of concern for all routes through which an individual may reasonably be exposed. A hazard index < 1 indicates that, based on the sum of all hazard quotients from all contaminants and exposure routes, toxic noncarcinogenic effects are unlikely. A hazard index > 1 indicates that site-related exposures may pose a risk to human health.

Hazard quotients are calculated as follows: Noncancer hazard quotient = CDI/RfD

where: CDI = chronic daily intake
RfD = reference dose.

CDIs and RfDs are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic or short-term).

The total noncancer hazard index estimated for exposure to groundwater at the Evergreen Manor site in the 2000 Risk Assessment is 0.34 for adults and 0.9 for children. The 2 chemicals contributing the most to the hazard index are acetone and TCE. These noncancer hazard indices of < 1 indicate that the intake of chemicals would be less than the amounts expected to cause adverse health effects, and that toxic noncarcinogenic effects from adult and child exposure to groundwater are unlikely.

TABLE 6-a
Revised Cancer Toxicity Data for TCE and PCE

Pathway: Ingestion, Dermal

Chemical	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
PCE	5.4E-01	5.4E-01	(mg/kg)/day	NA/liver	OSWER Directive No. 9285.7-75	6/12/03
TCE	4.1E-01	4.1E-01	(mg/kg)/day	NA	U.S. EPA Superfund Health Risk Technical Support Center	7/15/03

Pathway: Inhalation

Chemical	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
PCE	5.9E-06	(ug/m3) ⁻¹	3500	2..07E-02	(mg/kg)/day	NA/liver	OSWER Directive No. 9285.7-75	6/12/03
TCE	-	-	-	4E-01	(mg/kg)/day	NA	U.S. EPA Superfund Health Risk Technical Support Center	7/15/03

NA - Not applicable
OSWER - U.S. EPA Office of Solid Waste and Emergency Response

A - Human carcinogen
B1 - Probable human carcinogen; limited human data are available
B2 - Probable human carcinogen; sufficient evidence in animals; inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

TABLE 6-b
Recalculated TCE and PCE Cancer Risks
Adult Exposure to Groundwater

Recalculated Using Revised Toxicity Values for TCE and PCE and 2002 Groundwater Concentrations

Exposure Point	Chemical	Adult Cancer Risk			
		Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total
Tap water	PCE	3 x 10 ⁻⁵	1.2 x 10 ⁻⁵	4.3 x 10 ⁻⁶	4.6 x 10 ⁻⁵
	TCE	2.8 x 10 ⁻⁵	3.8 x 10 ⁻⁶	1 x 10 ⁻⁴	1.3 x 10 ⁻⁴
	Total	6 x 10 ⁻⁵	1.6 x 10 ⁻⁵	1.2 x 10 ⁻⁴	2 x 10⁻⁴

See Table 5-a for an explanation of carcinogenic risk calculations. Using the revised cancer toxicity data for TCE and PCE and the maximum concentrations of these chemicals detected in the groundwater in 2002 (7.9 ug/l for TCE and 5.9 ug/l for PCE) yields an excess lifetime cancer risk of 2 x 10⁻⁴ for exposure to groundwater under an adult residential scenario. This risk is slightly above U.S. EPA's generally acceptable risk range of 1 x 10⁻⁴ to 1 x 10⁻⁶ (1 additional case of cancer for every 10,000 to 1 million people similarly exposed). U.S. EPA did not recalculate the risks for child exposure to groundwater since these risks would be less than those calculated for adults.

TABLE 7-a
Soil Gas and Indoor Air Concentrations Analysis
for Chemical Vapors Above Screening Levels

Home A

Chemical	Maximum Concentration in Soil Gas (ug/m3)	Indoor Air Concentrations (ug/m3)		Could Chemical Be Site-Related?	Explanation	Chemical Included in Risk Evaluation for Home?
		Basement	1 st Floor			
Benzene	31	1.1	0.72	YES	Maximum soil gas concentration 27 times higher than indoor air concentrations. Unattached garage. One smoker but smoking not permitted in the house.	YES
Ethyl benzene	41	1.0	0.48	YES	Maximum soil gas concentration 40 times higher than indoor air concentrations. Unattached garage. One smoker but smoking not permitted in the house.	YES
Methylene chloride	0.9	27	2.40	INSIGNIFICANT AMOUNT	Indoor air concentrations 30 times higher than soil gas concentrations. Paints, polishes, cleaners, lubricants, etc. stored in basement. Basement concentration 11 times higher than 1 st floor concentration.	NO
PCE	0.88	0.7	0.7	PARTLY	PCE was detected in soil gas and was detected in soil gas at higher levels (4.41 and 190 ug/l) at 2 other homes. However, soil gas and indoor air concentrations are similar and PCE was detected in ambient air sample (collected from Area C) at a risk of 7.8×10^{-7} . Paints, polishes, cleaners, lubricants, etc., stored in basement.	YES
TCE	ND	ND	ND	ND	Not detected.	NA

ND - Not detected

NA - Not applicable; chemical not detected in indoor air.

SUMMARY: Benzene, ethyl benzene and tetrachloroethene considered site-related and included in risk evaluation. Methylene chloride considered household-related and not included in risk evaluation. Trichloroethene not detected.

TABLE 7-b
Soil Gas and Indoor Air Concentrations Analysis
for Chemical Vapors Above Screening Levels

Home B

Chemical	Maximum Concentration in Soil Gas (ug/m3)	Indoor Air Concentrations (ug/m3)		Could Chemical Be Site-Related?	Explanation	Chemical Included in Indoor Air Risk Evaluation for Home?
		Basement	1 st Floor			
Benzene	5.3	2.9	7	PARTLY	Benzene was detected in soil gas and was at high levels in soil gas (24.9 and 30.7 ug/m3) at 2 other homes. However, soil gas and indoor air concentrations are similar. Residents park in attached garage and have 3 5-gallon containers containing petroleum products. Not certain if containers removed prior to sampling. 1 or more smokers in home but smoking not permitted in house. Benzene concentrations 2.5x's higher on 1 st floor where door to garage is than in basement.	YES - Basement Concentrations
Ethyl benzene	8.9	5.9	13	PARTLY	Ethyl benzene was detected in soil gas and was detected at high levels (40.4 and 17.8 ug/m3) in soil gas at 2 other homes. However, soil gas and indoor air concentrations are similar. Residents park in attached garage and have 3 5-gallon containers containing petroleum products. Not certain if containers removed prior to sampling. 1 or more smokers in home but smoking not permitted in house. Ethyl benzene concentrations 2x's higher on 1 st floor where door to garage is than in basement.	YES - Basement Concentrations
Methylene chloride	0.8	99	28	INSIGNIFICANT AMOUNT	Indoor air concentrations 120 times higher than soil gas concentrations. Paints, polishes, cleaners, lubricants, paint removers, spot removers, etc. stored in basement. Methylene concentrations 3.5 times higher in basement than 1 st floor.	NO
PCE	4.4	11	3.4	PARTLY	PCE was detected in soil gas and was detected at high levels (190 ug/m3) in soil gas at 1 other home. However, indoor air concentrations are 2 times higher than soil gas concentrations. Paints, polishes, cleaners, lubricants, paint removers, spot removers, etc., stored in basement. Not clear what amount of PCE is household related and what amount could be site-related. Included in risk assessment.	YES
TCE	ND	ND	ND	YES	Detected at low levels in soil gas but not in indoor air. TCE not detected in ambient air sample (collected from Area C).	NA

ND - Not detected

NA - Not applicable; chemical not detected in indoor air.

SUMMARY: Some benzene and ethyl benzene from 1st floor garage. Basement concentrations used in risk evaluation. Methylene chloride mostly house-hold related and not included in risk assessment. Some PCE house-hold related but amount is not clear so included in risk evaluation. TCE considered site-related.

TABLE 7-c
Soil Gas and Indoor Air Concentrations Analysis
for Chemical Vapors Above Screening Levels

Home C

Chemical	Maximum Concentration in Soil Gas (ug/m3)	Indoor Air Concentrations (ug/m3)		Could Indoor Vapors Be Site-Related?	Explanation	Chemical Included in Indoor Air Risk Evaluation for Home?
		Basement	1 st Floor			
Benzene	25	0.76	0.84	YES	Soil gas concentration 30 times higher than indoor air concentrations. Unattached garage. No smokers. Paints and other products stored in unattached garage	YES
Ethyl benzene	18	0.6	0.8	YES	Soil gas concentration 23 times higher than indoor air concentrations. Unattached garage. No smokers. Paints and other products stored in unattached garage.	YES
Methylene chloride	0.98	ND	0.88	PARTLY	Methylene chloride was detected in soil gas. However, methylene chloride was not detected in the basement, and soil gas and indoor air concentrations are similar. Paints etc., stored in basement. Methylene Chloride not detected in ambient air sample (collected from Area C).	YES
PCE	190	3.2	0.76	YES	Soil gas concentration 60 times higher than indoor air concentrations. Paints and other products stored in unattached garage.	YES
TCE	9.5	ND	ND	YES	Detected in soil gas but not in indoor air.	NA

ND - Not detected

NA - Not applicable; chemical not detected in indoor air.

SUMMARY: Benzene, ethyl benzene and PCE included in the indoor air risk evaluation. Some methylene chloride may be household related but amount is not clear. Methylene chloride included in indoor air risk evaluation. TCE found in soil gas but not in indoor air.

TABLE 7-d
Soil Gas and Indoor Air Concentrations Analysis
for Chemical Vapors Above Screening Levels

Home D

Chemical	Maximum Concentration in Soil Gas (ug/m3)	Indoor Air Concentrations (ug/m3)		Could Indoor Vapors Be Site-Related?	Explanation	Chemical Included in Indoor Air Risk Evaluation for Home?
		Basement	1 st Floor			
Benzene	1.6	9.3	22	INSIGNIFICANT AMOUNT	Indoor air concentration s 13 times higher than soil gas concentrations. Residents park in attached garage and have 2 to 3 containers containing petroleum products. Not certain if containers removed prior to sampling. Leaf blower stored in garage. Benzene concentrations 2 times higher on 1 st floor where door to garage is than in basement.	NO
Ethyl benzene	1.9	4.8	8.1	INSIGNIFICANT AMOUNT	Ethyl benzene was detected in soil gas. However, indoor air concentrations are 4 times higher than soil gas concentrations. Residents park in attached garage and have 3 5-gallon containers containing petroleum products. Not certain if containers removed prior to sampling. Ethyl benzene concentrations about 1.5 times higher on 1 st floor where door to garage is than in basement.	NO
Methylene chloride	0.74	1	1.3	PARTLY	Methylene chloride was detected in soil gas. However, soil gas and indoor air concentrations are similar. Paints etc., stored in basement. Methylene Chloride not detected in ambient air sample (collected from Area C).	YES
PCE	0.94	0.82	1.3	PARTLY	PCE was detected in soil gas and was detected in soil gas at higher levels (4.41 and 190 ug/m3) at 2 other homes. However, soil gas and indoor air concentrations are similar and PCE was also detected in ambient air sample (collected from Area C) at risk of 7.8 x 10-7. Paints, etc., are also stored in basement.	YES
TCE	1.4	ND	ND	YES	Detected at low levels in soil gas but not in indoor air. Not detected in ambient air sample (collected from Area C).	NA

ND - Not detected

NA - Not applicable; chemical not detected in indoor air.

SUMMARY: Benzene and ethyl benzene mostly household-related and not included in indoor air risk evaluation. Methylene chloride and PCE may be partly site-related but amount is not clear. These chemicals were included in the indoor air risk evaluation. TCE found in soil gas but not in indoor air.

Carcinogenic Risks

ND	Not detected
(B)	Cancer risk calculated using basement concentration.
INSF	Chemical mostly household related. Risks from site-related vapors insignificant. Chemical concentrations not included in risk evaluation.

See Table 5-a for an explanation of cancer risk calculations. Risks calculated using maximum concentrations unless otherwise noted. No noncancer risks identified .

Noncarcinogenic Risks

ND	Not detected
(B)	Noncancer hazard index calculated using basement concentration.
INSF	Chemical mostly household related. Risks from site-related vapors insignificant. Chemical concentrations not included in risk evaluation.

See Table 5-b for an explanation of noncancer risk calculations. Risks calculated using maximum concentrations unless otherwise noted. No noncancer risks identified .

TABLE 9
Risk Characterization Summary
Exposure to Sediment

Sediment In Rock River Within and Downstream of Groundwater Discharge Zone

Exposure Point	Chemical	Detected Concentrations (ug/kg)	Frequency of Detection	Maximum Concentration Location	Region 9 Risk-Based Concentration for Residential Soil (ug/kg)	Chemical Above Risk-Based Screening Value?
Sediment	2-Butanone	3	1/10	SD-04	7,300	NO
	Freon 113	2 - 8	2/10	SD-01	5,600	NO
	Toluene	4 - 17	2/10	SD-01	520,000	NO

Chemical concentrations are well below the risk-based U.S. EPA Region 9 Preliminary Remediation Goals for Residential Soils and are not expected to pose any unacceptable risks to human health.

TABLE 10
Ecological Risk Summary
Exposure to Sediment

Sediment In Rock River Within and Downstream of Groundwater Discharge Zone

Exposure Point	Chemical	Detected Concentrations (ug/kg)	Frequency of Detection	Maximum Concentration Location	Lowest U.S. EPA Ecotox Threshold (ug/kg)	Most Conservative Canadian Sediment Criteria/Benchmark for Aquatic Life (ug/kg)	Chemical Above Ecological Screening Values?
Sediment	2-Butanone	3	1/10	SD-04	NE	NE	NO
	Freon 113	2 - 8	2/10	SD-01	NE	NE	NO
	Toluene	4 - 17	2/10	SD-01	670	890	NO

NE - Not established

Chemical concentrations are well below the lowest available sediment thresholds. Toxicological data are not available to evaluate the low levels of 2-butanone and Freon 113. However, the Screening Ecological Assessment conducted during the RI indicates a negligible potential for adverse effects on aquatic organisms in the Rock River from site-related chemicals.

TABLE 11
Ecological Risk Summary
Groundwater Discharge to Rock River

Residential Wells and Groundwater Samples

Chemical	Detected Concentrations (ug/l)	Frequency of Detection (1)	Maximum Concentration Location	Lowest U.S. EPA Ecotox Threshold (ug/l)	Most Conservative Canadian Freshwater Criteria/ Benchmark for Aquatic Life (ug/l)	Groundwater Concentration Above Ecological Screening Values?
1,1,1-Trichloroethane	0.29 - 5	18/44	RW-07	62	35	NO
1,1-Dichloroethane	0.19 - 2	4/44	CPT-11	47	NE	NO
1,1-Dichloroethene	0.16 - 0.2	1/44	MW-03	NE	11,600	NO
2-Butanone	16	1/44	CPT-05	NE	7,200	NO
Acetone	0.6 - 470	13/44	CPT-02	NE	NE	NO
Benzene	0.5 - 0.6	2/44	CPT-09	46	5.9	NO
Cis-1,2-Dichloroethene	0.39 - 2	4/44	RW-04, MW-105	NE	NE	NO
Ethyl benzene	0.6	1/44	CPT-09	290	8	NO
Freon 113	2 - 300	2/44	MW-103	NE	NE	NO
m- and/or p-xylene	0.5 - 0.7	3/44	CPT-06, CPT-09	1.8 *	2 *	NO
Methylene chloride	0.5	1/44	CPT-03	NE	98	NO
PCE	0.18 - 9	11/44	MW-103	120	5	YES
Toluene	0.5 - 3	19/44	CPT-11	130	0.8	YES
TCE	0.24 - 7.9	8/44	MW-03	350	1	YES
o-Xylene	0.6	2/44	CPT-02, CPT-11	NE	36	NO

NE - Not established

* - The value is for m-xylene

(1) Shallow and deep wells and multiple depths at CPT locations considered 1 location.

The maximum concentrations of PCE, toluene and TCE exceed the lowest available Canadian Environmental Quality Benchmarks for surface water (but are not above U.S. EPA Ecotox Thresholds). Because groundwater discharges to the Rock River, these and other site-related groundwater contaminants could pose a risk to the Rock River if they moved with the groundwater and emptied into the Rock River at levels that would threaten the river.

TABLE 12
Applicable or Relevant And Appropriate Requirements (ARARs)

- Safe Drinking Water Act (SDWA)
- Illinois Primary Drinking Water Standards (35 IAC Part 611)
- Occupational Safety and Health Act (OSHA)
- Resource Conservation and Recovery Act (RCRA) regulations for solid waste disposal and the generation and storage of hazardous waste (e.g., spent carbon)
- Clean Air Act (CAA)
- Clean Water Act (CWA)
- Illinois Effluent Standards (35 IAC Part 304)
- Illinois Permits and General Air Pollution Regulations (35 IAC Part 201).

TABLE 13
Cost Estimates

Costs	Alternative 1 No Further Action	Alternative 2 Groundwater Pump and Treat	Alternative 3 Monitored Natural Attenuation
Estimated Capital Cost	Minimal costs to abandon existing groundwater monitoring well network	\$12.8 million	\$1.8 million
Estimated Annual Operation and Maintenance (O&M) Costs Years 1 - 2 Years 3 - 5 Years 6 - 7 Years 8 - 10 Years 11 - 15	\$0	\$2.57 million \$1.86 million \$1.75 million \$1.03 million (Cleanup complete after year 8)	\$1.67 million \$1 million \$835,000 \$127,000 \$ 64,000
Estimated Present Worth	\$0	\$25.1 million	\$8.5 million

Costs include a 25% contingency and a 7% discount rate.

The actual cost of the Groundwater Pump and Treat Alternative could be significantly less and would depend on the results of sampling conducted prior to designing the pump and treat system, as well as the results of the long-term monitoring.

The costs for the Monitored Natural Attenuation Alternative assume that groundwater monitoring will continue annually for 3 years after cleanup levels are attained. The actual cost of this alternative could also be significantly less and would depend on the results of sampling conducted prior to developing the long-term groundwater and vapor monitoring plans, as well as the results of the long-term monitoring.

TABLE 14
Cleanup Standards for Groundwater

Chemical	Cleanup Standard (1) (ug/l)	Basis of Cleanup Standard
<i>Contaminants Detected in Groundwater and Residential Wells</i>		
1,1,1-Trichloroethane	200	MCL
1,1-Dichloroethane	NE	MCL
1,1-Dichloroethene	7	MCL
2-Butanone	NE	MCL
Acetone	NE	MCL
Benzene	5	MCL
Cis-1,2-Dichloroethene	70	MCL
Ethyl benzene	700	MCL
Freon 113	NE	MCL
m,p-xylene	10,000 (total xylene)	MCL
Methylene chloride	5	MCL
PCE	5	MCL
Toluene	1,000	MCL
TCE	5	MCL
o-Xylene	10,000 (total xylene)	MCL
<i>Other Breakdown Products of TCE and PCE That May Be Present in the Groundwater</i>		
Trans-1,2-Dichloroethene	100	MCL
Vinyl Chloride	2	MCL

MCL - Maximum Contaminant Level established under the Safe Drinking Water Act.

(1) In addition to attaining MCLs, the groundwater must be restored to an aggregate cancer risk of 1×10^{-4} and a noncancer hazard index less than 1.0 at all points throughout the aquifer for adult and child ingestion, inhalation and dermal contact under a residential exposure scenario.

TABLE 15
Selected Remedy Cost Estimate

Estimated Capital Cost: \$1.8 million

Estimated Annual Operation and Maintenance (O&M) Costs:

Year	Groundwater Monitoring	Residential Well Monitoring	Vapor Monitoring	All Monitoring
Years 1 - 2	\$205,000	\$71,000	\$1.4 million	\$1.67 million
Years 3 - 5	\$205,000	\$71,000	\$726,000	\$1 million
Years 6 - 7	\$ 92,000	\$35,000	\$726,000	\$835,000
Years 8 - 10	\$ 92,000	\$35,000	\$0	\$127,000
Years 11 - 15	\$ 46,000	\$18,000	\$0	\$64,000

Estimated Present Worth: \$8.5 million

Costs include a 25% contingency and a 7% discount rate.

The costs for the Monitored Natural Attenuation Remedy assume that groundwater monitoring will continue annually for 3 years after cleanup levels are attained. The actual cost of the remedy may be significantly less and will depend on the results of sampling conducted prior to developing the long-term groundwater and vapor monitoring plans, as well as the results of the long-term monitoring.